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High-pressure Suspension Mill



Shanghai Joyal Mining Machinery Co., Ltd

Grinding

• Application

The machine is mainly applied for the powder processing of mineral products in the industries of metallurgy, construction materials, chemical, and mining, etc. It can produce powder from various non-flammable and non-explosive mineral materials with Mohs hardness below 9.3 and humidity less than 6%, such as quartz, feldspar, calcite, talcum, barite, fluorite, cinder, cement clinker, activated carbon, dolomite, granite, soft coal, coking coal, lignite, magnesia, chromium oxide green, gold ore, red clay, clay, bolus alba, coke, coal Gangue, porcelain clay, kyanite, flour-spar, bentonite, medicinal stone liparite, diabase, pyrophyllite, shale red stone, emeraldite, basalt, gypsum, graphite, carborundum, heat insulating material, etc.



High-pressure Suspension Mill

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• Features

Compared with the common 5R4119 Raymond Mill under the same power conditions, the output of the machine is increased by 10%. Under the performance of high-pressure springs, the rollers grinding pressure on raw materials can be raised by 1500kgf.

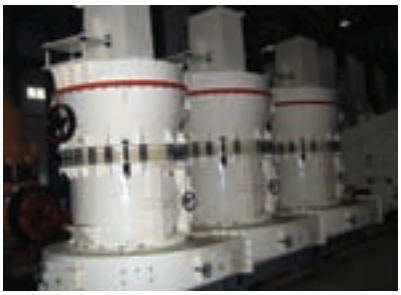
All the mineral materials with Mohs hardness below 9.3 can be crushed.

The finished powder size ranges from the maximum particle diameter of 0.613mm (30mesh) to the finest diameter of 0.033 mm (425 mesh). A few materials can-reach 0.013mm (1000 mesh).

Its dust-removing effect exactly meets the National Dust Discharge Standard.

The classifier is easy for adjustment.

The grinding device adopts a superposition multi-grade sealing with good sealing performance.



Grinding Plant



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Working Principle

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1.

The whole operating process of the mill（the crushing process of raw material ）is illustrated as follows：the agglomerate material is firstly crushed by the jaw crusher into the required particle size; Then the crushed material is transferred to a hopper by the elevator and fed uniformly, quantitatively and continuously by the vibration feeder into the grinding chamber of the main frame for pulverizing. The pulverized particles are brought up by the air current of the blower into the classifier for classification. The particles with the required fineness are brought up by the air current through the pipes into a cyclone collector for separation and collection and the finished particles are discharged from a pipe outlet. The air current is inhaled into the blower through the return pipe on the top of the cyclone collector. The air current of the whole system is in a sealed circulation under the condition of the positive and negative pressure.









3.

The main unit runs with a central shaft that is driven by a transmission device. The top of the shaft is connected with a quincunx stand, on which a grinding roller is installed to form a swing support. The grinding roller not only rotates around the center and the grinding ring, but also rotates around its own axis due to the friction.

2.

Due to some moisture contained in the material to be pulverized in a grinding chamber, the heat resulting from grinding leads to the vaporized air which changes the airflow volume. Moreover, the outside air inhaled from the narrow gaps of the piping connections can increase the volume of air current. Therefore, it is necessary to adjust the redundant air pipe between the blower and the main unit for keeping the balance of the air current. The redundant air is then guided into a cloth bag of a dust cleaner to collect the fine powder in the air. And the redundant air is discharged after purification.

Working Principle

4.

The classifier performs the function of classifying the particles by the rotation of blades on the disk driven by a speed-adjustable motor. The rotation speed of the blades is regulated according to the particle size of the finished powder. In order to realize a finer particle size, the rotation speed should be raised up to increase the contact between the blades and powder particles. The powder particles that do not meet the requirement are thrown by the blades to the outer wall and separated from the air current. The coarse particles drop because of self-gravity into the grinding chamber for regrinding. The qualified particles go through the blades and are inhaled by the air current into the cyclone collector. Then the particles are separated from the air current and collected.

5.

The cyclone collector plays an important role in the performance of the mill. When the air current with the powder enters the collector, it is at a high speed of rotation. After the air current is separated form particles, and when the air current concentrates towards the center along the cone wall and moves to the bottom of the cone (the natural length of the air current),an upward rotating air column is formed. Meanwhile, the particles are separated and fall down for collection. Because the core of the upward rotating air current is in state of negative pressure, the lower part of the collector must meet a very strict requirement of sealing and be isolated entirely from the outside air. Otherwise, the collected particles will be taken away by the central air current, which will directly influence the output of the complete system. Therefore, a powder-locking unit is installed under the collector. Its function is to isolate the outside positive pressure air from the negative pressure air inside the collector. This is a very important component. If the powder-locking unit is not installed, or the powder-locking unit has not strict sealing, the output of the complete system will be seriously influenced with no or less production of the finished powder.

Main Specifications

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Item / Model	Grinding Roller			Grinding Ring		Feeding Size (mm)	Output Size (mm)	Capacity (t/h)	Motor Power (kw)	Overall Dimension (mm)
	Numbers (pcs)	Diameter (mm)	Height (mm)	Outside Diameter (mm)	Height (mm)					
YGM75	3	260	150	865	150	<15	0.613-0.033	0.4-3.1	35.7	5000×4100×4850
YGM85	3	270	140	907	140	<20	0.613-0.033	0.5-4.0	42.7	5150×5000×5200
YGM95	4	310	170	1050	170	<25	0.613-0.033	1.1-5.6	72.5	7550×7400×8100
YGM130	5	410	210	1400	210	<30	0.613-0.033	2.2-9.5	157.5	8510×8000×9645
YGM160	6	440	270	1740	270	<35	0.613-0.033	8-22	253	12550×5700×8355

Whole System



The whole system of YGM130 high-pressure mill consists of main frame, reducer, classifier piping device, blower, jaw crusher, dustpan elevator, electromagnetic vibration feeder, and electric switch box motor etc. (For details, please refer to the Installation Foundation Diagram).

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Features of Whole System

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Features of Whole System

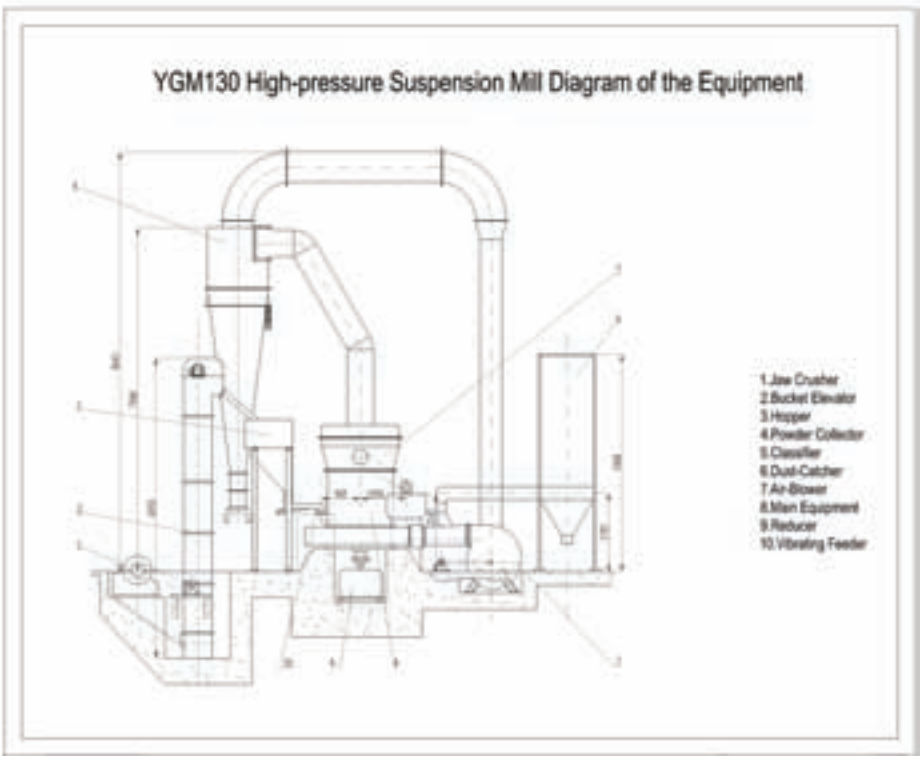
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1. The whole mill is of a standing structure. It features of small occupying space and strong integration capability. It can form up an independent production system from lump materials crushing to finished powder and packaging.
2. All the finished particles produced by the mill have a good uniformity of fineness. 98% of the particles can meet the required fineness and go through the sieve, i.e. the passing rate is 98%. This is the advantage that other power grinding equipment cannot exceed.
3. The transmission device of the main unit is equipped with a closed gearbox that runs smoothly and reliable. The key components of the mill are made of best quality steel, so the whole system is durable, stable and reliable.
4. The electrical system of the mill is centrally controlled and the advanced model is rationally selected with high automation. Basically, an unmanned operation can be realized in the pulverizing workshop. The light weight and compact vibration feeder can feed the material uniformly. It is easily adjustable, energy saving and convenient for operation and maintenance.





Grinding Plant



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Specification & Performance (To refer to diagram 1 & 2)

(Diagram 1)

Basic Units		Unit	Specifications & Technical Parameters
Motor of main unit	Model		Y280S-4
	Power	kw	75
	Rotating	r/min	1480
Motor of classifier	Model		YCT200-4B
	Power	kw	7.5
	Rotating	r/min	125-1250
Motor of elevator	Model		Y100L2-4
	Power	kw	3
	Rotating	r/min	1430
Motor of blower	Model		Y280S—4
	Power	kw	75
	Rotating	r/min	1480
Motor of jaw crusher	Model		PE 250×400
	Power	kw	15
	Rotating	r/min	970
Electromagnetic vibration feeder	Model		GZ2F
	Power	kw	150

Note: the crusher is optional according to different situations, such as the hardness of material, feeding quantity and etc.

Features of Whole System

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(Diagram 1)

Name	Unit	Specifications
Quantity of grinding rollers	piece	5
Grinding roller, diameter × height	mm	410×210
Grinding ring, diameter × height	mm	1280×210
Rotation speed of the main frame	r/min	103
Max. Feeding size	mm	30
Product fineness	mm	0.613-0.033
Capacity	t/h	2.2-9.5
Overall dimension: L×W×H	mm	8510×8000×9645

The Operation Rules of the Mill

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START Engine:

Before the powder grinding is started, check if all the maintenance doors are closed tightly and the gap between jaw plates of the crusher accord to the particle size of the feeding material., and the rotating speed of the classifier shall be adjusted in conformity of the required fineness of the finished powder. At last, turn on the machine according to the sequence below:

1. Turn on the dustpan elevator; 2. Turn on the jaw crusher; 3. Turn on the classifier after the hopper was fed with materials; 4. Turn on the blower (It starts with no load. You can load when the blower runs normally); 5. Turn on the main frame. And immediately turn on the electromagnetic vibrating feeder, after that, the powder grinding is started. The sequence of operation is outlined as follows:

Start elevator → crusher → classifier → blower → main frame → feeder

TURN OFF Engine:

Turn off the machine in the following sequence:

1.Turn off the feeder and stop feeding materials;

2.Turn off the main frame in one machine;

3.Turn off the blower after blowing off all the residual particles;

4.Turn off the classifier finally.

The sequence of turning off the machine is outlined as follows:

Feeder → main frame → blower → classifier

Note: The material transported to the hopper by an elevator. When the material in the hopper reaches a certain quantity, stop the crusher first and then the elevator. This operation depends on the quantity of the stored material

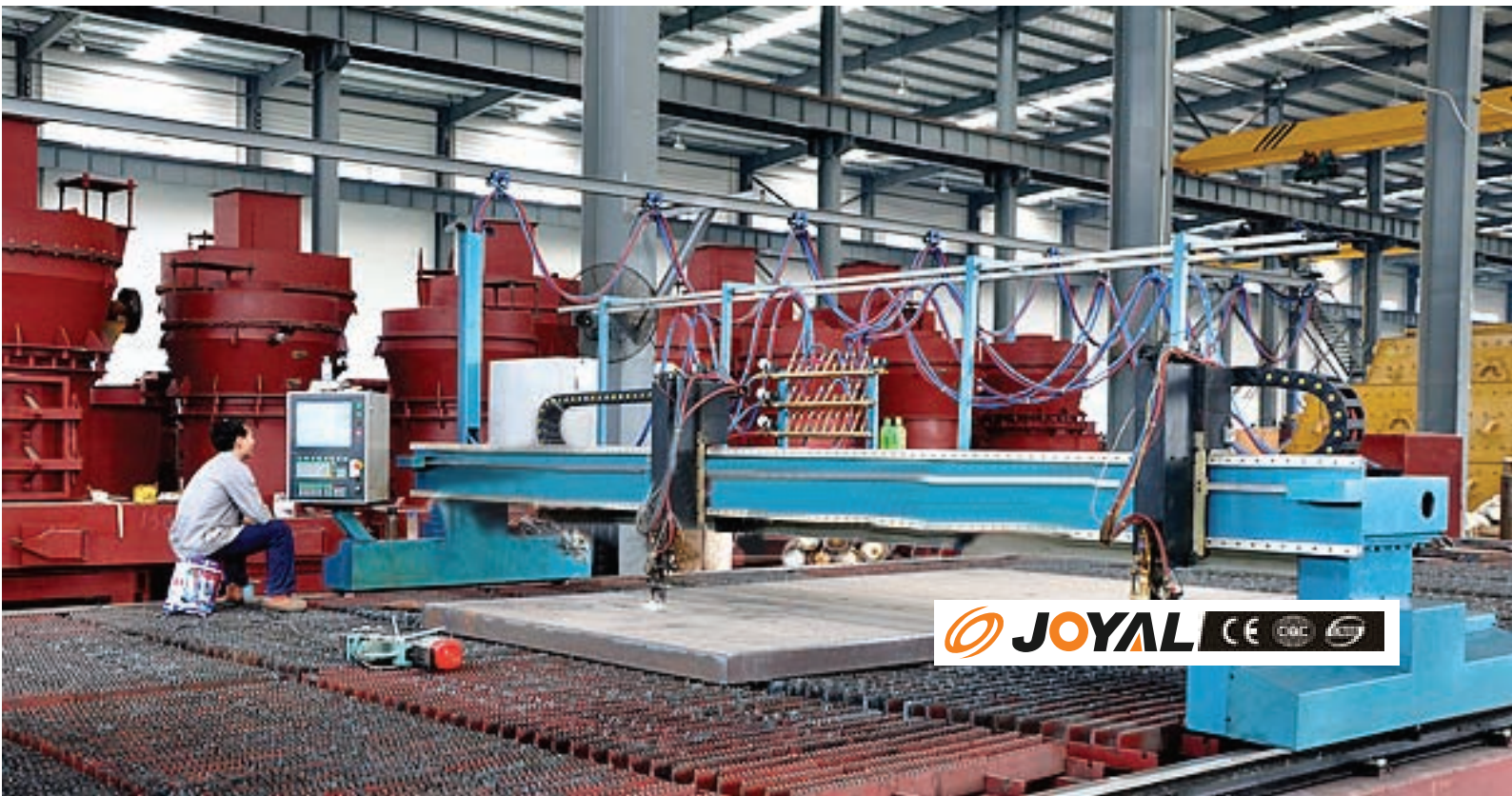
5.In order to guarantee the production safety, the mill must not be lubricated during the normal operation. If any part of the machines generates abnormal noises, or the load is suddenly raised up, turn off the machine immediately for checking and troubleshooting to prevent serious accidents. Before restarting the machine, take out the residual material first. Otherwise, the current will become strong as to affect the startup operation.

The Lubricating System

In order to ensure the normal operation of the whole system, please lubricate the machine according to the following instructions. Meanwhile pay attention to changes in gear box of oil, turbine oil tank height, that is, oil-soaked worm gear not less than 1 / 2. The oil height of reducer is not less than 300 mm from the bottom up. The height of oil pools on the oil standard of classifier is not less than 80 mm. Lubricating parts and oil names are stated in the following table:

The List of Lubricating System

Lubricating Parts	Lubrication Form		Name of Lubricating Oil	Lubricating Points	Interval of lubrication	Remarks
	Manual	Oil tank				
Central shaft of the main frame	√		No. 3 MOS2 compound calcium based grease	2	1-3 days	Replaced by calcium based grease
Grinding rollers	√		No.3 MOS2 compound calcium based grease	10	2shifts	Replaced by calcium based grease
Bearing base of blower	√		No.3 MOS2 compound calcium based grease	2	1 month	Replaced by calcium based grease
Bearing base of classifier	√		No.3 MOS2 compound calcium based grease	2	Half a month	Replaced by calcium based grease
Bearing base of elevator	√		No.3 MOS2 compound calcium based grease	2	1 month	Replaced by calcium based grease
Turbine box of elevator		√	HJ-4 machine oil	1	Keeping the oil level	Changing oil once every three months
Reducer		√	HJ-4 machine oil	3000hours		Maintenance, cleaning, oil changes
Oil Pool of classifier		√	HJ-4 machine oil	3000hours		Maintenance, cleaning, oil changes



■ The List of Lubricating System



The motor control system of the mill is centralized in the controlling cabinet. Every unit shall be started sequentially in accordance with the operation procedure and rules. In this control cabinet, most of the motors are generally asynchronous motors except classifier and feeder.

1. The starting of the main unit and blower

In this control system, the reduced voltage start is used for the motor with the power over 30KW while the direct start is for that below 30KW. In this system, blower with star delta starter, the main unit is used to start the Yanbian triangle.

The star delta starter is connected with normal operation. The control ircuit is composed of contactor and time relay. In an automatic switching, the customer can make adjustment according to the start. The time relay is usually set with an extension of over 6 seconds, which can be also adjusted by the customer.

2. The control and automatic feeding of the vibrating feeder

The structure of electric-magnetic vibrating feeder is a two particle fixed-directional forced vibration system. It consists of a feeding channel connected with a fork armature. It hangs under the material tank and with some free moving space. It cannot be blocked and bumped by other objects to avoid noises during the operation.

(1) After installation of the electro-magnetic vibrating feeder, loose the screws (upper three and lower one) on a positioning connection fork. After loosing the screws, fix the nuts, open the rear cover of the vibration feeder, and check if the gap between iron core and gap bit is within 1.8-2.1mm.The two parts should be parallel and clean. All the screws should be screw down firmly. Finally, put on the cover and fix it.

(2) No-load trial run with power on. Adjust the amplitude resistor R1 in the electrical control cabinet slowly from small to big with the amplitude ranging within 1.8-2.5mm and the current of 1.2A.Keep running for several hours to see if the amplitude current is stable. If it is normal, open the door of material tank for material feeding and check if the current of feeding material is stable. The amplitude is allowed to fall down 0.5 mm. If the amplitude current is at the rated value but cannot meet the requirement of the feeding capacity, hang the vibrator at a 20 decline position to meet the feeding requirement.

3. Control of Classifier

JDLA buncher transmission is used for the classifier. The control is carried out by the bottom of the electro-magnetic slide controller on the control cabinet. When the button is pressed, the squirrel-cage motor will be started first. Then close the slide power switch and turn the knob of rotating speed to make the classifier to reach the speed that matches the required fineness (powder particle size). The powder fineness can be controlled in this way.

Repair & Maintenance

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1.During the application of the mill, some personnel shall be arranged to take responsibility of management. The operators must be qualified with the required technical knowledge. Before the installation of the mill, the persons related to the operation should receive technical training and fully understand the operating principle, performance and regulations of the pulverizer.

2.In order to guarantee the mill in a normal working state, a Safety Operation System for the Maintenance of the equipment must be established. Only in this way can the pulverizer be guaranteed to have a long-term and safe operation. Meanwhile, it is necessary to have the required repairing tools, lubricant and grease, spare parts and accessories.

3.After some period of running, the mill should receive an examination and repairing. The components vulnerable to worn out, such as grinding roller, grinding ring, relieving tool etc. should be repaired or replaced. Before and after the operation, a careful examination should be carried out for the connecting screws, bolts and nuts on the grinding rollers so as to find whether they are loose or sufficiently lubricated.

4.The grinding rollers should be replaced when roller device works more than 500 hours. When replacing grinding rollers, all the rolling bearings in the roller sleeves must be cleaned, and the damaged parts should be replaced. Powerful injector and grease gun can be as oiling tool.



The Model Number of All the Bearings and Name and Quantity of the Quick-wear Parts.

For the mill and wearing parts, you can refer to these two tables in order that the customer can select them conveniently.

Table of Rolling Bearings

No.	Bearing Type	Specifications(mm)	Quantity	Relevant unit
1	2234	170×310×52	1	Up the main frame
2	3526	130×230×64	1	Down the main frame
3	8332	160×270×87	1	At the bottom of the main frame
4	7617	85×180×64	1	Decelerator
5	53618	90×190×64	1	Decelerator
6	7620	100×215×78	2	Decelerator
7	7626	130×280×99.5	2	Decelerator
8	7616	80×170×62	5	Above the grinding roller
9	3620	100×215×73	5	Below the grinding roller
10	310	50×110×27	1	Inside of the classifier
11	111311	55×120×29	1	Outside of the classifier
12	7315	75×160×40.5	1	Above the classifier
13	7312	60×130×34	1	Below the classifier
14	6308	40×90×23	4	Dustpan elevator
15	7208	40×80×20	2	Dustpan elevator Turbine decelerator
16	6208	40×80×18	2	Dustpan elevator Turbine decelerator
17	3616	80×170×58	2	Blower

The Model Number of All the Bearings and Name and Quantity of the Quick-wear Parts.

For the mill and wearing parts, you can refer to these two tables in order that the customer can select them conveniently.

Table wearing Parts

No.	Name	Quantity	Material	Specifications
1	Liner	1	HT200	
2	Dowel pin	12	MC Nylon 60	56
3	Dowel pin	12	MC Nylon 60	30
4	Spade	5	Welded with armor plate	
5	Spade base	5	ZG35	
6	Grinding roller device	5	Assembly	
7	Rubber sleeve	10	Special rubber	
8	Grinding roller	5	ZG65Mn	
9	Grinding roller shaft	5	No. 45 steel	
10	Crosspiece shaft	5	No. 45 steel	
11	Grinding ring	1	ZG65Mn	
12	Blower vane	6	Wearable armor plate	
13	Spade with bottom plate	1	ZG35	
14	Oil seal of framework	2	Top of main shaft	190×240×18
15	Bottom end cover of grinding roller	5	ZG35	
16	Oil seal of framework	2	Bottom of main shaft	130×160×15
17	Oil seal of framework	5	Grinding roller grade 3	115×150×14
18	Oil seal of framework	10	Grinding roller grade 2	115×150×14
19	Sealing ring	5	Industry wool felt	
20	Blade of classifier	60	Wearable armor plate	
21	Wind guard board	12	Wearable armor plate	
22	Wedge shaped belt	6		C-3150
23	Wedge shaped belt	4		B-3150



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